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SPECIFICATION

TITLE OF THE INVENTION

LIQUID MAGNETIC PROCESSING UNIT

BACKGROUND OF THE INVENTION

The present invention relates to a liquid magnetic processing unit that activates a liquid by magnetic force of a permanent magnet.

A conventional liquid magnetic processing unit of this kind is shown as a water treatment unit, for example, in Japanese Patent Laid-Open 8-355642 gazette (CO2F5/00) applied by the applicant. The water treatment unit is constituted such that a plurality of permanent magnets are incorporated in a predetermined distance, a pair of cases having each permanent magnet exposed are provided at an opening, and the case is designed to be inserted into a water pipe. Accordingly, the liquid that flows in the water pipe having a diameter of about 50 mm piped in a small size factory and a general house has been activated without making a large-scale work.

However, the liquid magnetic processing unit of this type of structure can activate the liquid by working a magnetic flux of the permanent magnet, in which an N pole and an S pole mutually attract, to the entire liquid flowing in the water pipe as long as it is a thin water pipe piped in the small size factory and the general house. But in the

case of a thick water pipe having the diameter of about 500 mm to 1000 mm piped in a middle size or a large size factory and the like, the magnetic force does not work to an approximate center of the pipe so as to mutually attract the N pole and the S pole, and thus the liquid flowing in the pipe could not be activated. Therefore, development of the liquid magnetic processing unit that can activate the liquid flowing in the pipe of a thick diameter has been desired.

SUMMARY OF THE INVENTION

The present invention has been created to solve the problem in such prior art. The object of the present invention is to provide the liquid magnetic processing unit that can activate the liquid flowing in the thick pipe to treat water.

Specifically, the liquid magnetic processing unit of the present invention is a unit wound around the pipe, in which the liquid flows, to activate the liquid by the magnetic force, which comprises a water treatment section having a band wore around the pipe and a plurality of magnet housings equipped to the band in an inserting manner, which house a plurality of permanent magnets inside, and the water treatment section is covered with a case that consists of non-magnetic material.

In addition to the foregoing, in the liquid magnetic processing unit of the present invention, permanent magnets having different polarities are reciprocally arranged

adjacent to each other in the magnet housing, and the permanent magnets of the different polarities are reciprocally arranged in the magnet housings equipped to the band in the inserting manner and arranged adjacent to each other.

In the liquid magnetic processing unit of the present invention, in addition to the foregoing, a waterproof member is filled between the water treatment section and the case.

Furthermore, the liquid magnetic processing unit of the present invention is a unit wound around the pipe, in which the liquid flows, to activate the liquid by the magnetic force, comprises a plurality of the permanent magnets, and each permanent magnet is arranged so as to balance magnetism of the N pole and the S pole in the approximate center of the pipe.

Still further, the liquid magnetic processing unit of the present invention is a unit wound around the pipe, in which the liquid flows, to activate the liquid by the magnetic force, which comprises the water treatment section having a plurality of the permanent magnets of different polarities from each other housed inside, even numbers of the water treatment sections are arranged around the pipe in an opposing manner to each other sandwiching the pipe, the water treatment sections are arranged to make the polarities of permanent magnets opposing to each other sandwiching the pipe to be the same so as to balance magnetism of the N pole and

the S pole in the approximate center of the pipe and to make the polarity of the permanent magnet provided in one of adjacent water treatment sections and the polarity of the permanent magnet in another water treatment section adjacent to the foregoing permanent magnet to be different.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a front view of the liquid magnetic processing unit of the present invention.

Fig. 2 is an assembly perspective view of the water treatment sections constituting the liquid magnetic processing unit of the present invention.

Fig. 3 is a front view of the water treatment sections inserted through the band constituting the liquid magnetic processing unit of the present invention.

Fig. 4 is a rear view of the water treatment sections inserted through the band of Fig. 3.

Fig. 5 is a side view of the water treatment sections inserted through the band of Fig. 3.

Fig. 6 is a view showing the arrangement of the permanent magnets in the magnet housing equipped to the band constituting the water treatment section in the inserting manner.

Fig. 7 is a view showing the state where the water treatment sections constituting the liquid magnetic processing unit of the present invention are attached around the pipe.

Fig. 8 is a schematic view of the magnetic flux of the permanent magnets when the water treatment sections constituting the liquid magnetic processing unit of the present invention are attached around the pipe.

Fig. 9 is a front view of the case constituting the liquid magnetic processing unit of the present invention.

Fig. 10 is a side view of the liquid magnetic processing unit of the present invention when it is attached around the pipe.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Next, the embodiment of the present invention will be described in detail based on the drawings. Fig. 1 is a front view of a liquid magnetic processing unit 10 of the present invention. Fig. 2 is an assembly perspective view of the water treatment sections 11 constituting the liquid magnetic processing unit 10 of the present invention. Fig. 3 is a front view of the water treatment sections 11 inserted through a band 20 constituting the liquid magnetic processing unit 10 of the present invention. Fig. 4 is a rear view of the water treatment sections 11 inserted through the band 20 of Fig. 3. Fig. 5 is a side view of the water treatment sections 11 inserted through the band 20 of Fig. 3. Fig. 6 is a view showing the arrangement of permanent magnets 19 in magnet housing 12 equipped to the band 20 constituting the water treatment section 11 in the inserting manner.

The liquid magnetic processing unit 10 is attached

to a thick water pipe 33 having the diameter of about 500 mm to 1000 mm disposed as a pipe in a middle size or a large size factory and the like. Preferably, the liquid magnetic processing unit 10 is installed to a water feeding source of a water pipe 33 disposed in the middle size or the large size factory and the like, and it activates the liquid flowing in the water pipe 33 to improve water quality. The liquid magnetic processing unit 10 is constituted of the water treatment sections 11, the band 20 and a case 25.

The water treatment section 11 is constituted of external boxes 13, internal boxes 16 and permanent magnets 19, in which the boxes 13 and 16 consist of a stainless steel plate being non-magnetic and hard to stain, and the external box 13 is formed in an approximate rectangular shape of about 60 mm (length), about 15 mm (width) and about 20 mm (height) by making its four corners bent in an approximate right angle. The external box 13 forms an opening 13A by making one side thereof open to be constituted such that the internal box 16 (described later) can be inserted from the opening 13A.

Band holes 15B of about 22 mm (length) and about 1.5 mm (width) through which the band 20 (described later) can be inserted are formed penetrating both side plates 15 being the sides of the external box 13 in a longitudinal direction. The band hole 15B are formed in the vicinity of a top plate 14 being a top surface of the external box 13 so as to extend in the longitudinal direction. Note that reference numeral 15A denotes a caulking hole.

The internal box 16 is also formed in an approximate rectangular shape of about 54 mm (length), about 12 mm (width) and about 14 mm (height) by making its four corners bent in an approximate right angle similarly to the external box 13. The internal box 16 forms an opening 16A by making one side thereof open, a plurality of the permanent magnets 19 (described later) (six pieces in this case) are housed in the internal box 16 from the opening 16A in approximately close contact with the box, and a plurality of the permanent magnets 19 are approximately adhered and fixed on a bottom plate 17 being a bottom surface of the internal box 16.

The permanent magnets 19 housed in the magnet housing 12 are arranged with their polarities reciprocally set. Caulking holes 18A are formed on both side plates 18 being the sides of the internal box 16 in a longitudinal direction, and the caulking holes 18A are formed in the positions corresponding to the caulking holes 15A formed on the external box 13. Then, the internal box 16 is inserted from the opening 13A of the external box 13 (in this case, the internal box is inserted from the opening side). Rivets are inserted through the both caulking holes 18A and 15A in the state where the both caulking holes 18A and 15A of the external box 13 and the internal box 16 are in line, and thus the magnet housing 12 is complete.

In addition, the permanent magnet 19 is constituted of a permanent magnet 19 such as neodymium (Nd-Fe-B) that is relatively easily processed and has strong magnetic force,

and is formed in a size that can be housed in the internal box 16 by approximately abutting to the side plate 18. Specifically, the permanent magnet 19 is formed in a column shape having the diameter of about 9 mm and the height of about 6 mm, and each of the adjacent permanent magnets 19 is housed in the internal box by reciprocally setting its polarity. And then, the opening 16A side of the internal box is housed in the external box 13 from the opening 13A of the external box 13 in the state where a plurality of the permanent magnets 19 are housed in the internal box 16 in approximately close contact (see arrow in Fig. 2). At this point, an area of the side plate 18 of the internal box 16 closer to the opening 16A stops at the position where the side plate 18 does not obstruct the band holes 15B formed on the external box 13.

The band 20 is formed in a band shape having the width of about 20 mm and the thickness of about 0.3 mm, is constituted of a stainless steel plate hard to stain easily, synthetic resin or an elastic member such as cloth (more preferably of the stainless steel plate), and is constituted of an enough length such that the band 20 can wind around the water pipe 33. A plurality of the magnet housings 12 are equipped to the band 20 in the inserting manner.

The band 20 is inserted through the band holes 15B (the band holes 15B formed on the external box 13) of the magnet housing 12. At this point, the band 20 is equipped to the magnet housing 12 such that the internal box 16 positions

on one side of the band 20 and the external box 13 position on the other side of the band 20. Then, joining members 22 and 22 are severally attached between the magnet housings on the both ends equipped to the band 20 in an inserting manner and the magnet housings 12 that are positioned next to the ones on the both ends (Figs. 3, 4 and 5).

Note that reference numerals 21 and 21 are stoppers fixed by caulking at the both end portions of the band 20, and the stoppers 21 are formed a little larger than the band hole 15B to prevent the band 20 from slipped off the band holes 15B of the side plate 15. In addition, reference numerals 22A and 22A are bolt holes.

Further, in the magnet housing 12 adjacent to another housing in approximately close contact, which is inserted through the band 20, the permanent magnets are arranged having their polarities set different from each other. In this case, when the polarities of the permanent magnets 19 are reciprocally arranged, for example, in the S pole, the N pole, the S pole, the N pole and so on from the top end sequentially in the magnet housing 12 of the left end, the polarities of the permanent magnets 19 are reciprocally arranged in the N pole, the S pole, the N pole, the S pole and so on from the top end sequentially in the magnet housing 12 of the second from the left end. Moreover, the polarities of the permanent magnets 19 are arranged in the same polarities as the permanent magnets 19 in the magnet housing 12 of the left end, that is, reciprocally arranged in the S

pole, the N pole, the S pole, the N pole and so on from the top end sequentially.

And then, even numbers of the magnet housings 12 are inserted through the band 20. In this case, the permanent magnets 19 housed in the both magnet housings 12 and 12 inserted through the band 20 at one end and at another end thereof are made to have different polarities in the state where the water treatment sections 11 are attached to the water pipe 33 (Fig. 7). Specifically, the even numbers of the water treatment sections 11 are arranged around the water pipe 33 in order to oppose to each other sandwiching the water pipe 33 so as to balance the magnetism of the N pole and the S pole in the approximate center of the water pipe 33, and the water treatment sections 11 are arranged such that the permanent magnets 19 opposing to each other sandwiching the water pipe 33 are made to have the same polarity and thus the polarity of the permanent magnet 19 provided in one of adjacent water treatment sections 11 and the polarity of the permanent magnet 19 provided in another the water treatment section 11 adjacent to the concerned permanent magnet 19 are made to be different.

Herein, in a conventional liquid magnet processing unit have generally had a method of activating the liquid by magnetization in which a plurality of the permanent magnets are attached externally around the pipe, and the magnetic flux where the N pole and the S pole of the opposing permanent magnets attract or the magnetic flux repulsive

between the S and S poles and the N and N poles is formed so that the magnetic flux directly works to the liquid flowing in the pipe. In such a unit, the magnetic force fell near the center of the pipe as a pipe diameter became thicker, and the liquid could not be activated because the magnetic flux could not work directly to the liquid flowing in the pipe. Accordingly, the conventional liquid magnetic processing unit has been used only for the thin pipe diameter. Moreover, the conventional liquid magnetic processing unit has been used only for the pipe of a non-magnetic material through which the magnetic flux can transmit due to the rationale characteristic.

Fig. 8 shows a schematic view showing the magnetic flux of the permanent magnets 19 attached to the water pipe 33. In this embodiment, a plurality of the permanent magnets 19 are arranged around the water pipe 33 to make the polarities of the opposing permanent magnets 19 to be the same. In Fig. 8, for convenience of explanation, four pieces of the permanent magnets 19 are arranged around the water pipe 33 to make the polarities of the opposing permanent magnets to be the same.

In this case, the magnetic flux of the permanent magnet 19 is parabolically formed toward adjacent permanent magnets 19 and 19, opposing permanent magnets 19 and 19 with the same polarity are repulsive each other, and thus a magnetic field in which the magnetize of the N pole and the S pole is balanced (hereinafter, referred to as a zero magnetic

field) is formed inside the water pipe 33. Formation of the zero magnetic field in the water pipe 33 enables a water molecule to increase the degree of freedom of an electric charge, promotes the activation of the liquid flowing in the water pipe 33, and thus the water quality is improved. The zero magnetic field is formed in the pipe regardless of a non-magnetic or a magnetic material.

Herein, the zero magnetic field is a position where two magnetic fields of inverse directions are formed around two lead wires when currents of inverse directions are severally made to flow in the two lead wires, the magnetic fields interfere in an area there the two magnetic fields overlap to change the direction and the size of the magnetic field, and the intensity of the magnetic field becomes zero. The position where the intensity of the magnetic field becomes zero is an area where a plus and a minus (the N and S poles or the S an N poles) counteract each other to make the intensity of the magnetic field to be zero in a position having the same intensity of each magnetic field and the directions of the magnetic fields are antipole to each other.

Although the zero magnetic field cannot measure by any accurate measurement device, it is confirmed that the water quality changes (activated) when a container containing water is placed in the zero magnetic field because the two magnetic fields are overlapped in the zero magnetic field. Specifically, the constitution is made such that the zero magnetic field is formed in the pipe by arranging the

permanent magnets 19 around the pipe, the zero magnetic field promotes the physical change of the liquid without being affected by a pipe diameter, a pipe material and a flow rate in the pipe, and the liquid in the pipe can be activated.

Then, the water treatment sections 11 are attached to the water pipe 33 with the band 20. In this case, even numbers of the water treatment sections 11 are equipped to the band 20, and an appropriate number of the water treatment sections 11 that can be equipped around the water pipe 33 in approximately close contact shall be equipped to the band 20 in an inserting manner. Then, the water treatment sections 11 are wound and attached to the water pipe 33 as the pipe arranged in the middle size or the large size factory. In this case, bolts 23 are inserted through the bolt holes 22A and 22A of the joining members 22 and 22 provided at the both ends of the band 20 after the internal boxes 16 of the water treatment sections 11 are adhered and fixed around the water pipe 33, and nuts 24 are tightened to fix the water treatment sections 11 to the water pipe 33.

And then, the water treatment sections 11 fixed to water pipe 33 with the band 20 are covered with the case 25. The case 25 covers the entire the water treatment sections 11 in the state where the water treatment sections 11 are fixed to the water pipe 33 with the band 20, and is constituted of a pair of case bodies 26 and 26 that consist of the non-magnetic material hard to stain such as stainless steel. The case body 26 is constituted of a large diameter portion 27

and a small diameter portion 28, and the large diameter portion 27 is formed in a size that can cover only a half of the water treatment sections 11 fixed to the water pipe 33 with the band 20.

In addition, the small diameter portion 28 is formed sequentially at both sides of the large diameter size portion 27, and the small diameter portion 28 is formed in a size that can cover only a half of the outer diameter of the water pipe 33 to which the liquid magnetic processing unit is attached. Specifically, the cases 26 and 26 are constituted to sandwich the water treatment sections 11 fixed to the water pipe 33 with the band 20 from both sides to house the water treatment sections 11 inside the large diameter portion 27 and to sandwich the water pipe 33 with the small diameter portion 28.

Moreover, a collar 29 with a predetermined width is formed around the case 26, and the screw holes 29A are severally formed at the four corners of the collar 29. The collar 29 is formed so as to extend from the case body 26 by a predetermined distance, and the collars 29 and 29 formed on the both case bodies 26 and 26 so as to opposingly abut the water treatment sections 11 in the state that the water treatment sections 11 is sandwiched from the both sides. The both case bodies 26 and 26 are fixed together and the case 25 is fixed to the water pipe 33 by inserting screws 30 into the screw holes 29A and by tightening nuts 30A from the other side (Fig. 10). Note that reference numeral 31 denotes a

fixed screw, the fixed screws 31 are provided around the small diameter portion 28, and the case body 26 is fixed to the water pipe 33by tightening.

A waterproof member 32 is filled between the both case bodies 26 and 26 and the water pipe 33 in the state where the case 25 is attached to that water pipe 33, and the water treatment sections 11 covered with the case, band 20, the joining member 22 and the like are fixed by the waterproof member 32. The waterproof member 32 is constituted of such as a silicon foaming agent having waterproofness, and prevents water from penetrating the space between the both case bodies 26 and 26 and the waterproof member 32. Specifically, the permanent magnet 19 constituted of metal such as neodymium easily stains, and the magnetic force reduces if the permanent magnet 19 stains. Therefore, the waterproof member 32 is filled between the both case bodies 26 and 26 and the water pipe 33 to prevent the permanent magnets 19 from staining.

As described, the water treatment sections 11 housing a number of the permanent magnets 19 are covered with the case 25 that consists of the non-magnetic material, and the permanent magnets 19 having different polarities are reciprocally arranged adjacent to each other in the magnet housing 12. Since the permanent magnets 19 in the magnet housings 12 equipped to the band in an inserting manner and adjacent to each other are reciprocally arranged in the different polarities, a strong magnetic field in which the

magnetism of the N and S poles is balanced in the approximate center in the water pipe 33 can be formed. Accordingly, a strong zero magnetic field can be formed inside the water pipe 33, the zero magnetic field can be formed inside the thicker water pipe than the water pipe disposed in the general house. Therefore, even the liquid in the thick water pipe, which has not been conventionally activated, can be certainly activated.

The even numbers of the water treatment sections 11 are arranged around the water pipe 33 in order to oppose to each other sandwiching the water pipe 33, the water treatment sections 11 are arranged such that the permanent magnets 19 opposing to each other sandwiching the water pipe 33 are made to have the same polarity so as to balance the magnetism of the N pole and the S pole in the approximate center of the water pipe 33, and the polarity of the permanent magnet 19 provided in one of adjacent water treatment sections 11 and the polarity of the permanent magnet 19 provided in another the water treatment section 11 adjacent to the foregoing permanent magnet 19 are made to be different. With this arrangement, the strong magnetic field in which the magnetism of the N and S poles of a plurality of the permanent magnets 19 is balanced can be formed in the water pipe 33 even if the magnetic flux does not work conventionally such that the N and S poles of the permanent magnets 19 attract each other to the approximate center of the pipe having a thick diameter. Accordingly, the liquid flowing in the pipe of the thick

diameter can be certainly activated.

Moreover, since the waterproof member 32 is filled between the water treatment sections 11 and the case 25, disadvantage such that the permanent magnets 19 stains due to the liquid or humidity can be certainly prevented. Thus, the permanent magnets 19 are prevented from staining, and the liquid magnetic processing unit 10 can be used semipermanently.

Furthermore, it is already well known that generation of stain, red water and scales or slime can be prevented if the magnetic flux is applied to the liquid (the liquid flown through the zero magnetic field is also included). Installing the liquid magnetic processing unit 10 to the water feeding source of the thick water pipe 33 disposed in the middle size or the large size factory can prevent the generation of stain, red water and scale or slime in the water pipe in the entire premises of the middle size or the large size factory. With this installation, improvement of cooling efficiency by preventing cooling water piping system of a cooling unit, which is connected to the water pipe and uses tap water, from adhering the scale and slime can be also made.

Still further, since the liquid magnetic processing unit 10 is constituted to be attached externally to the water pipe 33, a working period for attaching the liquid magnetic processing unit 10 can be significantly shortened. Moreover, the liquid magnetic processing unit 10 can be attached

externally to the water pipe 33, not only the cost for attachment can be reduced but also the unit can be attached without stopping water supply. In addition, the water quality of mixed drainage can be improved by attaching the liquid magnetic processing unit 10 around a pipe for the mixed drainage use. Accordingly, depuration is improved and odor can be reduced. Thus, a chemical amount used for the depuration and the odor reduction can be reduced.

Note that the liquid magnetic processing unit 10 was used for the thick water pipe 33 in the embodiment, but the liquid magnetic processing unit 10 of the present invention may be used for the water pipe disposed in the general house.

The present invention is also effective when the liquid magnetic processing unit 10 is attached around the pipe having a thick diameter (not shown) to form the zero magnetic field inside the pipe, and food such as miso (soybean paste) and pickles, soy source, bottled or barreled liquor, juice, drinking water or the like is made to pass or placed in the zero magnetic field in order to activate it for better taste.

Further, in the embodiment, even numbers of the magnet housings were equipped to the band 20 in an inserting manner, and one end and the other end of the band 20 were fixed in the state where the water treatment sections 11 were attached to the water pipe. The present invention is not limited to this, but is effective when the water treatment sections 11 are equipped to the band 20 in a predetermined

distance and the water treatment sections 11 are equipped to the water pipe 33 in approximately close contact in the state that the band 20 is spirally wound around the water pipe, the permanent magnets 19 housed in one of adjacent magnet housings 12 equipped to the band 20 in an inserting manner and the permanent magnets 19 housed in another magnet housing 12 are made to have different polarities, and the zero magnetic field in which the magnetism of the N and S poles is balanced inside the water pipe 33 is formed.

Although the magnetic field where the magnetism of the N and S poles is balanced inside the water pipe 33 was referred to as the zero magnetic field, the magnetism of the N and S poles is not necessarily balanced in the zero magnetic field and the magnetism may be off balanced to either the N pole or the S pole by a little degree.

Further, a plurality of the water treatment sections 11 were attached to the water pipe 33 with the band 20 and covered with the case 25. The present invention is not limited to this, but is effective even if a plurality of the water treatment sections 11 are attached to the water pipe 33 by other methods without using the band 20 and the case 25 when the permanent magnets 19 are arranged to make the inside of the water pipe 33 to be the zero magnetic field.

According to what has been described above in detail, the present invention is a unit wound around the pipe in which the liquid flows and that activates the liquid by the magnetic force, which comprises: the water processing

sections having the band and the magnet housings equipped to the band in an inserting manner and in which a plurality of the permanent magnets are housed. Since the case that consists of the non-magnetic material covers the water treatment sections, the strong magnetic field in which the magnetism is balanced can be formed in the pipe, for example, by arranging the permanent magnets having different polarities each other adjacently in the magnet housing and by arranging the permanent magnets in the magnet housings equipped to the band in an inserting manner and adjacent to each other in the different polarities. Accordingly, for example, the strong magnetic field in which the magnetism is balanced in the pipe thicker than the pipe disposed in the general house is formed, and the liquid in the pipe can be certainly activated.

Particularly, energy does not need to be externally supplied because the liquid magnetic processing unit uses the permanent magnets. Thus, energy can be significantly saved.

Furthermore, since the waterproof member was between the water treatment sections and the case, the permanent magnets can be certainly prevented from being wet by the liquid. Accordingly, the permanent magnets can be prevented from staining by the waterproof member filled in the space even in the case where the permanent magnets such as neodymium easily chipped off and easily stained. Thus, since the permanent magnets are prevented from staining certainly, the liquid magnetic processing unit can be used

semipermanently and convenience of the liquid magnetic processing unit can be significantly improved.

Moreover, the present invention is a unit wound around the pipe in which the liquid flows and that activates the liquid by the magnetic force, and it comprises a plurality of the permanent magnets and each permanent magnet is arranged such that the magnetism of the N and S poles is balanced in the approximate center of the pipe. Therefore, the magnetic field in which the magnetism of the N and S poles of a plurality of the permanent magnets 19 is balanced can be formed even if the magnetic flux does not work conventionally such that the N and S poles of the permanent magnets attract each other to the approximate center of the pipe having a thick diameter. Accordingly, the liquid flowing in the pipe of the thick diameter can be certainly activated. Thus, even the liquid flowing in the pipe of the thick diameter can be activated certainly in the magnetic field in which the magnetism of the N and S poles are balanced.

Still further, the present invention is a unit wound around the pipe in which the liquid flows and that activates the liquid by the magnetic force, and it comprises the water treatment sections in which a plurality of the permanent magnets having the different polarities each other are adjacently housed. And even numbers of the water treatment sections are arranged around the pipe opposing to each other sandwiching the pipe, the water treatment sections are

arranged such that the permanent magnets opposing to each other sandwiching the water pipe are made to have the same polarity in order to make the magnetism of the N and S poles is balanced in the approximate center in the pipe, and thus the polarity of the permanent magnet 19 provided in one of adjacent water treatment sections 11 and the polarity of the permanent magnet 19 provided in another the water treatment section 11 adjacent to the concerned permanent magnet 19 are made to be different. Thus, for example, the strong magnetic field in which the magnetism of the N and S poles of a plurality of the permanent magnets is balanced can be formed in the water pipe even if the magnetic flux does not work conventionally such that the N and S poles of the permanent magnets attract each other to the approximate center of the pipe having a thick diameter. Accordingly, even the liquid flowing in the pipe of the thick diameter can be certainly activated in the strong magnetic field in which the magnetism of the N and S poles of a plurality of the permanent magnets is balanced.